

analyzing of the elements in a sample comprising:

[an online sampling means for receiving a sample;]

at least one X-ray source for directing X-rays toward the sample; and

at least one [X-ray fluorescence] detector for detecting X-ray fluorescence from [said] the sample and [for] producing signals in response thereto [to said X-ray fluorescence, wherein said at least one X-ray source and said at least one X-ray fluorescence detector are mounted in a geometry that maximizes X-ray detection and sensitivity], said X-ray detector being mounted within two inches of the sample to maximize X-ray detection and sensitivity.

✓ Please cancel Claim 2 without prejudice.

✓ Please amend Claim 6 as follows:

A7 6. (Amended) The apparatus of Claim 1, further comprising a thin window [(0.002-0.010 inches)] disposed between the sample and [the] said at least one X-ray detector.

✓ Please cancel Claim 7 without prejudice.

✓ Please amend Claim 8 as follows:

A8 8. (Amended) The apparatus of Claim 1, [wherein] further [comprising] including a [shaping] leveling device [for maintaining a uniform sample surface] to maintain a fixed distance between the sample and said at least one X-ray detector.

✓ Please amend Claim 9 as follows: ✓

9. (Amended) The apparatus of Claim 8, wherein said [shaping] leveling device comprises a fixed plow or a [flow cell] leveling plate.

Please cancel Claim 10 without prejudice.

Please amend Claim 11 as follows:

A9 11. (Amended) The apparatus of Claim 1, further [comprising a] including means for detecting the presence of [sufficient sample material] a sufficient level of material flowing past said at least one X-ray detector to permit repeatable analyses.

In Claim 13, please replace "comprising" with -- including --.

Please cancel Claims 14 and 15 without prejudice.

Please add new dependent Claims 16 and 17:

A10 7 16. (New Claim) The apparatus of Claim 1, wherein said at least one X-ray source produces incident X-rays in the range of 3-20 KeV.

2 17. (New Claim) The apparatus of Claim 1, further including an analyzer for determining the elemental composition of said sample based on the signals received from said at least one X-ray fluorescence detector.

Please add new Claims 18-27:

Sub B17 18. (New Claim) An apparatus for online elemental analysis of a sample comprising:
at least one X-ray source for directing X-rays toward the sample;
at least one X-ray fluorescence detector for detecting X-ray fluorescence from the sample and for producing signals in response thereto; and
an analyzer for determining the elemental composition of said sample based on the signals received from said at least one X-ray fluorescence detector;
said at least one X-ray source being characterized by a transmission axis

and said at least one X-ray fluorescence detector being characterized by a detection axis, said X-ray transmission axis and said detection axis being parallel to each other and normal to the sample surface.

19. (New Claim) An apparatus for the online detecting or analyzing of the elements in a sample comprising:

at least two X-ray sources for directing X-rays toward the sample; and
at least one X-ray fluorescence detector for detecting X-ray fluorescence from the sample and for producing signals in response to said X-ray fluorescence, wherein said X-ray fluorescence detector is mounted between said at least two X-ray sources.

20. (New Claim) The apparatus according to Claim 19, wherein said at least two X-ray sources are each characterized by a transmission axis, said at least one X-ray fluorescence detector is characterized by a detection axis, and each said transmission axis and said detection axis are aligned to within 30 degrees of the sample surface normal.

21. (New Claim) The apparatus according to Claim 19, wherein each of said at least two X-ray sources is characterized by a transmission axis, said at least one X-ray fluorescence detector is characterized by a detection axis, and said each transmission axis and said detection axis are parallel to each other and normal to the sample surface.

22. (New Claim) The apparatus according to Claim 19, further including an analyzer for determining the elemental composition of said sample based on the signals received from said at least one X-ray fluorescence detector.

13. 23. (New Claim) A method for completing online elemental analysis, comprising